REMARKS

These remarks follow the order of the paragraphs of the office action. Relevant portions of the office action are shown indented and italicized.

DETAILED ACTION

A request for continued examination under 37 CFR 1114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under Ex Parte Quayle, 1935 Comm'r Dec. 11(1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicants submission filed on January 31,2005 has been entered. Since the Examiner did not consider the preliminary amendment filed on July 7, 2004, which should be entered with RCE filed on January 31, 2005, thus, the finality of the Office Action mailed on march 21, 2005 is expressly withdrawn. A non-final action followed.

Claim Rejections - 35 U.S.C. § 102

The following is a quotation of the appropriate paragraphs 0135 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -. (e) the invention was described in a patent Wanted on an application for patent by another fired in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs 1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent

Claims 1, 3, 9, 15, 18-19,21-22, 46-49, 59-61, 65-66. 65-90 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6256349 to Suzuki et al. ("Suzuki" a reference of record).

As to claim 1, Suzuki discloses a method for digitally processing integer transform data representing a phenomenon, the method comprising: performing an inverse transform of said integer transform data (after quantized in encoding side, The data is integer data transformed) to the real domain forming high-precision numbers (Fig. 2 element 84, col. 3 line 1-col. 4 line 14 and col. 12 lines 36-61, col. 29 lines 36-37); and directly manipulating said high-precision numbers to produce an effect (Fig. 2, col. 12, lines 33 col. 13, line 64, note that the effect can be prediction image etc.).

As to claim 3, Suzuki further discloses the phenomenon is an image (Fig. 2).

As to claims 9 and 22, Suzuki further discloses IDCT (col. 12, lines 55-62).

As to claim 15, Suzuki further discloses inverse quantization (Fig, 2 element 83).

As to claims 18-19, Suzuki further discloses the coded data are image and video data (abstract).

As to claim 21 Suzuki further discloses MPEG (col. 1, line 48-50).

As to claims 46-49, 59-61 65-66 the claims 46-47, 59-61 and 65-66 are the corresponding system . article of manufacture, and program storage device claims to claims 1,3, and 15. The discussion are addressed with regard to claims 1, 3, and 15.

As to 85-90, the elements are addressed with regard to claims 1 and 15.

In response, applicants respectfully state that the present invention as claimed in Claims 1, 3, 9, 15, 18-19,21-22, 46-49, 59-61, 65-66, and 84-90 are very different than Suzuki. In explanation to the Examiner, it is noted that many of today's data compression algorithms are lossy. The source image input to the encoder is not exactly reconstructed as output in the decoder even assuming error-free transmission of the compressed data. Most of the loss is introduced during the quantization step in the encoder for transform-based algorithms such as JPEG baseline (DCT-based), JPEG 2000 (wavelet-based) , and MPEG (DCT-based with motion compensation). Ideally, the reconstructed data could be re-encoded using identical quantization values and would produce exactly the same compressed data. In practice, the transform coefficients are often not identical and each iteration may introduce additional loss thereby progressively degrading the image. This is known as the **multi-generation problem.**

The multi-generation problem primarily comes from rounding (or truncating) the inverse transformed data (i.e the reconstructed data) in order to produce integer values in the real domain as required by the JPEG standard and expected for the image processing, print, or display buffers. Since the original image input to the encoder is an integer, the reconstructed image output from the decoder is required to be in the same format (i.e. integers). For lossy coding these errors introduced by rounding/truncating are sufficient to accumulate on the next iteration into the transform space and change the quantized coefficients in a block.

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The present invention as claimed in Claims 1, 3, 9, 15, 18-19,21-22, 46-49, 59-61, 65-66 and 84-90, provides keeping extra reconstructed output precision so that the rounding/truncating error is not large in the data to be re-transformed and re-quantized. Since the inverse quantization step reconstructs the coefficients in the middle of the quantization zone, small errors from the finite precision inverse and forward transformations are not sufficient to move into a neighboring quantization value if the data is unchanged. This solution required all processing to be handled with greater precision too. The forward transform expected the extra precision.

Indeed, Suzuki (US 6,256,349 B1) actually provides excellent evidence that the standard encoders and decoders only take in integers and put out integers of the original precision. In our application in the background applicants talk about the JPEG standard have a precision P. The decoder is expected to output the same precision. Our higher-precision output with precision P+n prevents the rounding to integers with precision P which introduces the error that degrades the image content in multiple decode/re-encode cycles.

The high precision numbers referred to in Suzuki are original input data as integers with greater than 8 bits of precision (Col 16 L15-21). The high precision numbers in our invention means greater than the original input precision fed to the forward transform on a second iteration. Suzuki doesn't iterate the transforming and inverse transforming on the same data like our application does.

According to Suzuki "The DCT circuit ... needs to be fed with 8-bit precision picture data if the .. mode is the intra-picture prediction mode, while it needs to be fed with 9-bit precision picture data ... if the ... mode is the inter-picture prediction mode,..." (col. 17 lines 43-55) "That is, the bit precision of the picture data block inputted to the picture signal encoding apparatus needs to be converted from 10-bit precision to the 8-bit precision in order for the block to enter the difference signal encoder (col 17 lines 52-55)." "It is this 8-bit precision picture data block that is outputted ... (col 18 lines 46-47)." These quotes all show how the prior art implementations convert to integers. For the example given (MPEG) the integers are 8-bit integer data for intra-frame coding and 9-bit integer difference data for inter-frame coding. For JPEG the

precision, P, is either 8 bit or 12 bit for the DCT transform data. In Claims 1, 3, 9, 15, 18-19,21-22, 46-49, 59-61, 65-66 and 84-90, applicants are manipulating and re-forward transforming data of greater precision than P. These claims as worded do not follow the standard by converting to the original precision since it is this conversion process that introduces the errors that cause the multigeneration problem.

In contradistinction, Suzuki converts to the 8- or 9-bit integer data (see col 19 lines 29-30; col 21 lines 5-16; col 22 lines 31-39; col 23 lines 15-21) even though the original source is 10-bit (or 9- or 11-bit data as suggested in col 25 lines 14-15). The parts of the invention that reduce the source input to 8 bits prove the standard FDCT can't handle the 10-bit source data. The extra precision is then used after the ENCODER reconstructs the 8-bit data which is multiplied by 4 and subtracted from the original 10-bit data and the difference encoded. In Claims 1, 3, 9, 15, 18-19,21-22, 46-49, 59-61, 65-66 and 85-90, applicants don't encode a difference. Applicants don't reconstruct the data in the encoder. Our decoder uses an encoder that accepts higher precision data and applicants get exactly the same compressed data as before if no pixels were modified.

Thus Claims 1, 3, 9, 15, 18-19,21-22, 46-49, 59-61, 65-66 and 85-90, as written and/or amended, are novel over the cited art, and are allowable.

Claim Rejections -35 U.S.C. § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be Obtained though the invention is not identically disclosed or described as set form In section 102 ... .

Claims 2, 4-8, 10-11, 16-17,20,23-25,55-58 and 84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki in view of US 6176205 to Cheung et al. ("Cheung" a reference of record). As to claims 2 and 16, Suzuki does not explicitly mention manipulating , clipping the integers to an allowed range forming converted image. Cheung, in an analogous environment, discloses converting said high-precision numbers to integers and clipping the integers to an allowed range forming converted image (col. 10. lines 30.46, note that converting and clipping is one kind of manipulating). It would

have been obvious to one having ordinary skill in the art at the time the invention was made to include the scheme of Cheung in the method of Suzuki in order to improve the output quality of the images (Cheung, col. 1, line 50 - col.2, line 21). Doing so would remove the blocking effect and errors in the output image so that the quality of the method is improved.

As to claims 8 and 25, Cheung further discloses fraction parts (col. 7, table 2).

As to claims 4-7, 10-11, 17, 20, 23-24, 55-58, Cheung does not explicitly mention the features of chroma-key merging, color correction, image rotation (90 degree), floating number: IDWT, IDFT, entropy decoding, JPEG, raster display monitor, spectral analysis and audio signal. However, the examiner takes Official Notice that these features are notoriously well known in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to include these features in the method of Cheung in order to improve the quality of the images.

In response, applicants respectfully state that even the combined art does not teach the invention claimed in Claims 2, 4-8, 10-11, 16-17,20,23-25,55-58 and 84. The office action may not employ hindsight to make combinations that allegedly include the elements of the present invention.

It is noted that Cheung (US Patent 6,178,205 B1) is improving the appearance of video images by motion-compensated temporal filtering and spatial adaptive filtering. The "errors" referred to in this patent are from the original quantization. They are trying not to introduce "further degradation" (col 2 line 20) while removing artifacts and noise. It is not dealing with the errors introduced during the decoding process by rounding in the pixel domain. Thus neither Suzuki nor Cheung teach transforms that accept higher precision data. Nor do they separately or together iterate and achieve the original compressed data . Thus Claims 2, 4-8, 10-11, 16-17,20,23-25,55-58 and 84, as written and/or amended, are novel over the cited art, and are allowable.

It is anticipated that this amendment brings the application to allowance of all claims except as withdrawn. Favorable action is respectfully solicited. If any rejections or objections remain, please call the undersigned.

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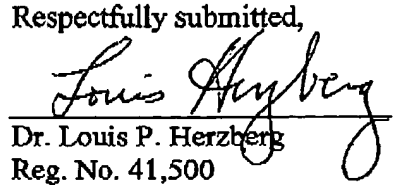
Respectfully submitted,

By: 

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